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10/500,342	12/30/2004	Ghorghe Iordanescu	015280-457100US	8951

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EXAMINER	
PARK, EDWARD	

ART UNIT	PAPER NUMBER
2624	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/500,342	IORDANESCU ET AL.	
	Examiner	Art Unit	
	EDWARD PARK	2624	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *27 May 2008*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-14* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-14* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Claim Objections

1. In response to applicant's amendment of claims 9-12, the previous claim objection is withdrawn. However, a new claim objection is brought about due to the amendment of claims 11 and 12.

2. Applicant is advised that should claim 9 be found allowable, claim 12 will be objected to under 37 CFR 1.75 as being a substantial duplicate thereof. When two claims in an application are duplicates or else are so close in content that they both cover the same thing, despite a slight difference in wording, it is proper after allowing one claim to object to the other as being a substantial duplicate of the allowed claim. See MPEP § 706.03(k).

Claim Objections - 37 CFR 1.75(a)

3. In responsive to applicant's amendment of claims 1 and 5, the previous claim objection is withdrawn.

Claim Rejections - 35 USC § 101

4. In responsive to applicant's amendment of claims 1 and 9-11, the previous claim rejection is withdrawn.

Claim Rejections - 35 USC § 102

5. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

6. **Claims 1-6, 9-12, 13, 14** are rejected under 35 U.S.C. 102(b) as being anticipated by Vining et al (US 5,920,319).

Regarding **claim 1**, Vining discloses an automated detection algorithm embodied in a computer readable medium, the automated detection algorithm (see fig. 4, col. 2, lines 6-9 computer-implemented method and computer system) to compute the ring profile of colon like surfaces comprising the steps of:

providing an original image of a colon like surface disposed along a major axis in a scan having vertex points, each vertex point having a discrete point identifier and three dimensional position information (see figure 1, numeral 34; col. 5, lines 30-39 images are arranged to create a three-dimensional data volume at step 34);

generating a shrunken version of the colon like surface (see fig. 1, numeral 38; col. 7, lines 54-67; col. 8, lines 1-7 where wireframe model has been generated) utilizing neighbors averaging of the three dimensional position information for every vertex point in the original colon view (col.

8, lines 39-58 where normal vectors at the respective vertices can be computed as the average of the normal vectors associated with each polygon connected to that vertex);

modeling the shrunken version of the colon like surface with an ordered set of 3-D points to produce a curve proximate to the major axis of the colon like surface (see col. 13, lines 47-62 central path algorithm uses an object's three-dimensional skeleton to find a path that lies along the center of its lumen);

isolating segments of vertex points between planes normal to the curve proximate to the major axis of the colon like surface from the shrunken version of the colon like surface (see figure 1, numeral 45; col. 10, lines 66-67; col. 11, lines 1-10 vertices on the wireframe model associated with abnormal structure are grouped into populations);

mapping the isolated segments of vertex points from the shrunken version of the colon like surface back to the original image of the colon like surface to generate a ring profile of the colon like surface (see figure 1, numeral 49, 50; col. 12, lines 44-67; col. 13, lines 1-46 three-dimensional rendering of the wireframe model is displayed … allowing the user to view the interior surface of the structure).

Regarding **claim 2**, Vining discloses decimating the vertex points of the provided original image (see figure 1, numeral 35 region of interest is segmented from the three-dimensional data volume which is equivalent to reducing the amount of vertex points).

Regarding **claim 3**, Vining discloses computing a centerline of the colon utilizing the ring profile of the colon like surface (see col. 13, lines 36-46 finite, intersection planes contain the central path of the wireframe model).

Regarding **claim 4**, Vining discloses measuring along the computed centerline of the colon like surface to determine positional information relative to the colon like surface (see col. 14, lines 12-22 distance transform for the three-dimensional region-grown object is then calculated).

Regarding **claim 5**, Vining discloses smoothing the computed centerline of the colon (see col. 13, lines 36-46 finite, intersection planes contain the central path of the wireframe model and removing any accessory paths that run through small holes caused by anatomical variation or image segmentation artifacts).

Regarding **claim 6**, Vining discloses utilizing the ring profile along a preselected length of the computed colon centerline (see col. 8, lines 39-57 predetermined distance) to determine the local colon volume and local colon distension along the preselected length of the colon (see col. 2, lines 20-32 wireframe model analyzed to detect sections of the object having the selected characteristic such as abnormal wall structures).

Regarding **claim 9**, Vining discloses an automated detection algorithm embodied in a computer readable medium, the automated detection algorithm (see fig. 4, col. 2, lines 6-9 computer-implemented method and computer system) to compute the ring profile of colon like surfaces comprising the steps of:

providing an original image of the colon like surfaces disposed along a major axis in a scan having the colon like surface identified by vertex points, each of vertex point having a discrete point identifier and three-dimensional positional information (see figure 1, numeral 34; col. 5, lines 30-39 images are arranged to create a three-dimensional data volume at step 34);

generating a shrunken image of the colon like surface (see fig. 1, numeral 38; col. 7, lines 54-67; col. 8, lines 1-7 where wireframe model has been generated) utilizing a neighbors averaging of the three-dimensional positional information for vertex points in the original colon view (col. 8, lines 39-58 where normal vectors at the respective vertices can be computed as the average of the normal vectors associated with each polygon connected to that vertex);

randomly designating a first vertex modeling point at a vertex point along the shrunken colon image (figure 6, numeral 82; col. 12, lines 36-55);

identifying and marking neighboring vertex points to the randomly selected first vertex modeling point (figure 6, numeral 84; col. 12, lines 36-55);

designating a second vertex modeling point located at a predetermined distance from the first vertex modeling point (figure 6, numeral 84; col. 12, lines 36-55);

sequentially repeating the identifying and marking, and designating steps to designate vertex modeling points from the randomly selected first vertex modeling point to an end of the colon (figure 6, numeral 88'');

connecting the designated vertex modeling points to produce a curve proximate to the major axis of the colon like surface (figure 9; col. 12, lines 1-35);

isolating groups of vertex points between planes normal to the curve from the shrunken image of the colon like surface (see figure 1, numeral 45; col. 10, lines 66-67; col. 11, lines 1-10 vertices on the wireframe model associated with abnormal structure are grouped into populations); and

mapping the isolated groups of a vertex points from the shrunken image of the colon like surface back to the original image of the colon like surface to generate a ring profile of the colon like surface (see figure 1, numeral 49, 50; col. 12, lines 44-67; col. 13, lines 1-46 three-dimensional

rendering of the wireframe model is displayed … allowing the user to view the interior surface of the structure).

Regarding **claim 10**, Vining discloses an automated detection algorithm embodied in a computer readable medium, the automated detection algorithm (see fig. 4, col. 2, lines 6-9 computer-implemented method and computer system) to compute an approximate centerline profile of colon like surfaces comprising the steps of:

providing an original image of the colon like surfaces disposed along a major axis in a scan having the colon like surface identified by vertex points, each of vertex point having a discrete point identifier and three-dimensional positional information (see figure 1, numeral 34; col. 5, lines 30-39 images are arranged to create a three-dimensional data volume at step 34);

generating a shrunken image of the colon like surface (see fig. 1, numeral 38; col. 7, lines 54-67; col. 8, lines 1-7 where wireframe model has been generated) utilizing a neighbors averaging of the three-dimensional positional information for vertex points in the original colon view (col. 8, lines 39-58 where normal vectors at the respective vertices can be computed as the average of the normal vectors associated with each polygon connected to that vertex);

randomly designating a first vertex modeling point at a vertex point along the shrunken colon image (figure 6, numeral 82; col. 12, lines 36-55);

identifying and marking neighboring vertex points to the randomly selected first vertex modeling point (figure 6, numeral 84; col. 12, lines 36-55);

designating a second vertex modeling point located at a predetermined distance from the first of vertex modeling point (figure 6, numeral 84; col. 12, lines 36-55);

sequentially repeating the identifying and marking, and designating steps to designate vertex modeling points from the randomly selected first vertex modeling point to an end of the colon (figure 6, numeral 88''); and

connecting the designated vertex modeling points to produce a curve proximate to the major axis of the colon like surface (figure 9; col. 12, lines 1-35).

Regarding **claims 11 and 12**, the claim is rejected under the same conditions as claim 9.

Regarding **claim 13**, Vining discloses determining the center point of a bounding box associated with the ring profile, wherein the centerline includes the center point of the bounding box (see figure 10a, b, e, col. 14, lines 60-67, col. 15, lines 1-42).

Regarding **claim 14**, Vining discloses a smaller bounding box than the original image of the colon like surface (see figure 10e, col. 15, lines 22-42).

Claim Rejections - 35 USC § 103

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

8. **Claim 7** are rejected under 35 U.S.C. 103(a) as being unpatentable over Vining et al (US 5,920,319) in view of Kaufman et al. (US 7,194,117 B2).

Regarding **claim 7**, Vining discloses the all elements as mentioned above in claim 1. Vining does not disclose mapping the vertices distance to the computed centerline; and building an image of vertices distances to centerline to map the colon.

Kaufman teaches mapping the vertices distance to the computed centerline; and building an image of vertices distances to centerline to map the colon (see figure 24, 25; col. 28, lines 20-39 each representative point is centered with respect to the colon wall).

It would have been obvious at the time the invention was made to one of ordinary skill in the art to modify the Vining teaching to utilize a value closest to the desired value in terms of image resolution as suggested by Kaufman, so the user is able to visually refer to the volume/image data in regards to diagnosing abnormalities.

9. **Claim 8** is rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of Vining et al (US 5,920,319) with Kaufman et al. (US 7,194,117 B2), and further in view of Vining (US 5,782,762). Vining (US 5,782,762) will be referred to as Vining 2 from hereon.

Regarding **claim 8**, Vining discloses the all elements as mentioned above in claim 1. Vining does not disclose mapping the vertices distance to the computed centerline to obtain a mapped centerline view of the colon; rotating the mapped centerline view of the colon to spatially reorient the mapped centerline view of the colon; and reconstructing a spatially reoriented image of the colon from the rotated centerline view by expanding the vertices distances to map the colon.

Kaufman teaches mapping the vertices distance to the computed centerline to obtain a mapped centerline view of the colon (see figure 24, 25; col. 28, lines 20-39 each representative point is centered with respect to the colon wall).

It would have been obvious at the time the invention was made to one of ordinary skill in the art to modify the Vining teaching to utilize a value closest to the desired value in terms of

image resolution as suggested by Kaufman, so the user is able to visually refer to the volume/image data in regards to diagnosing abnormalities.

Vining 2 teaches rotating the mapped centerline view of the colon to spatially reorient the mapped centerline view of the colon (see col. 15, lines 1-9 object is rotated in space); and reconstructing a spatially reoriented image of the colon from the rotated centerline view by expanding the vertices distances to map the colon (see fig. 10, col. 13, lines 12-34).

It would have been obvious at the time the invention was made to one of ordinary skill in the art to modify the Vining with Kaufman combination to rotate and reconstruct the image of the colon as suggested by Vining 2, to "enable the user to rapidly view a series of three-dimensional images of the lumen of the colon for purpose of detection of pathological conditions" (col. 3, lines 23-32).

Response to Arguments

10. Applicant's arguments filed on 5/27/08, in regards to **claim 1**, have been fully considered but they are not persuasive. Applicant argues that Vining does not teach generating a shrunken version of the colon like surface utilizing neighbors averaging of the three position information for every vertex point in the original colon view, especially the shrunken version (see pg. 9, last paragraph, pg. 10, first paragraph). This argument is not considered persuasive since in col. 7, lines 54-67; col. 8, lines 1-7; where the wireframe model has been generated meets the limitation of the shrunken version of the colon like surface. The adjective shrunken means to become reduced in amount or value. Therefore, the wireframe model which is a model of the region of interest as indicated by Vining and the applicant meets the limitation of the claim since a wireframe model is a model that has less information then a 3d volume model. Furthermore, the

applicant states on pg. 10, fourth paragraph that the wireframe model comprises a polygonal mesh that corresponds to the surface of the region of interest.

Applicant argues Vining does not disclose a shrunken version of a colon like surface is generated by averaging three dimensional position information from neighbors (see pg. 11, second paragraph). This argument is not considered persuasive since in figure 1, numerals 39-45, col. 7, lines 61-67, col. 8, lines 1-58, where connectivity matrices are determined which provide information regarding the connectivity between the vertices and polygons which comprise the wireframe model, by generating sets of immediate neighbor vertices and triangles associated with each vertex and polygon in the lists. The vertices of the wireframe model are grouped by utilizing normal vectors at the respective vertices that are computed as the average of the normal vectors associated with each polygon connected to that vertex, or can be computed as a weighted average of the normal vectors associated with polygons of the wireframe model which are within a predetermined distance from a specific vertex. Therefore, the specific claim limitation is met by the prior art of record.

Applicant argues that Vining does not disclose isolating segments of vertex points between planes normal to the curve proximate to the major axis of the colon like surface from the shrunken version of the colon like surface (see pg. 11, fourth paragraph). This argument is not considered persuasive since in figure 1, numeral 45, col. 10, lines 66-67, col. 11, 1-10, where vertices on the wireframe model associated with abnormal structure are grouped into populations meets the limitations of the claim. Applicant further argues that grouping in Vining include only a subset of the vertices between planes normal to the curve and provides an example that a lesion could be on an upper surface of a cylindrical organ. This argument is not considered persuasive

since a subset can be considered as the whole set, and secondly the applicant is bringing in the limitations from the claim that are not present. The applicant argues that since the lesion is only on the upper surface, the grouping representing the lesion would not include the vertices on the lower surface of the cylinder. This limitation is not present in the claimed invention as seen in claim 1. The limitation simply covers in scope, isolating segments of vertex point between planes normal to the curve proximate to the major axis. It does not mention that the isolation needs to encompass the upper and lower surfaces. In response to applicant's argument that the references fail to show certain features of applicant's invention, it is noted that the features upon which applicant relies (i.e., grouping only includes a subset of the vertices between the planes normal to the curve which includes a lower and upper surface if there were a lesion on the upper surface) are not recited in the rejected claim(s). Although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims. See *In re Van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993).

Applicant argues that Vining does not disclose mapping the isolated segments of vertex points from the shrunken version of the colon like surface back to the original image of the colon like surface to generate a ring profile of the colon like surface (see pg. 13, second paragraph). This argument is not considered persuasive since Vining discloses the limitation in figure 1, numeral 49, 50, col. 12, lines 44-67, col. 13, lines 1-46, three-dimensional rendering of the wireframe model is displayed … allowing the user to view the interior surface of the structure). Furthermore, applicant argues that the limitation is not met by Vining due to the lack of the teaching of isolated segments of vertex points between planes normal to the curve proximate the major axis of the colon like surface, as argued above. This argument is not considered

persuasive because Vining discloses the previously stated limitation and the arguments can be seen above.

Regarding **claims 7, 8**, applicant argues that the claims are allowable due to dependency from claim 1 (see pg. 14, section V). This argument is not considered persuasive since claim 1 stands rejected and the arguments and the rejection can be seen above.

Regarding **claims 2-6**, applicant argues that the claims are allowable due to the dependency from claim 1 (see pg. 13, section B). This argument is not considered persuasive since claim 1 stands rejected and the arguments and the rejection can be seen above.

Regarding **claims 9-12**, applicant argues that the claims are allowable due to the similarity of the claim limitations in regards to claim 1 (see pg. 13, section C). This argument is not considered persuasive since claim 1 stands rejected and the arguments and the rejection can be seen above.

Conclusion

11. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event,

however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to EDWARD PARK whose telephone number is (571)270-1576. The examiner can normally be reached on M-F 10:30 - 20:00, (EST).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Vikkram Bali can be reached on (571) 272-7415. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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